Agricultural practice and nitrogen leaching in a field experiment: Risk analyses using the NLEAP model

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Intensification (tillage, fertilizer application, plant growing, irrigation) of the natural conditions of Fluvisol creates conditions for more intensive water movement through the soil profile and migration of nutrients. Monitoring results showed that groundwater has neutral to alkaline reaction, which does not exceed the maximum permissible pH value 8.5. Nitrate concentrations depend on fluctuation of groundwater table due to capillary upraising of nitrate at depth below 2,00 from the geological profile. Considerably high fluctuation of groundwater table was observed during the monitoring period. Maximum and minimum levels of the groundwater followed the seasonal distribution of the precipitation typical for the region.

Nitrate content in the groundwater was influenced by the reduced anthropogenic loading with fertilizers and a decreasing trend in nitrate concentration could be seen during several years in the end of the monitoring period (1972–2004) when nitrate concentrations were around and below the maximum permissible limit. The highest nitrate concentrations were measured during spring-summer months.

As a general conclusion, a certain effect of the anthropogenic loading was observed on the chemical composition of groundwater on the studied soil. In order to prevent pollution by agricultural practices it is necessary to maintain a deficit in nitrogen balance and irrigation management has to be done in a way to insure low drainage flow and nitrogen in the irrigation water has to be accounted for in the cycle of nutrients. The tests of NLEAP model showed good agreement between measured and simulated output parameters. The information of leached nitrogen could be used as predictive tool for the risk analyses in vulnerable regions.